Eichrom Users' Group Workshop at the RRMC

51st Annual RRMC

Workshop organized by Eichrom Technologies, Inc.
Chairperson: Lawrence Jassin, jassin@eichrom.com

Abstract: Eichrom is a worldwide provider of products and services in the field of analytical chemistry, with offices in metro Chicago and Rennes, France. Registered to the ISO 9001:2000 standard, Eichrom focuses on developing analytical methodologies that set industry standards for measuring environmental contaminants such as radioactive elements, hazardous metals and dioxins.

This year's workshop will highlight research and initiatives from inside of Eichrom and by key scientists in the radiochemistry community. Sherrod Maxwell of Westinghouse Savannah River Company will present an update on a new, rapid actinide separation method that provides total dissolution of large soil samples, high chemical recoveries and effective removal of matrix interferences. This method uses stacked TEVA Resin ®, TRU Resin and DGA Resin cartridges that allows the rapid separation of plutonium (Pu), neptunium (Np), uranium (U), americium (Am) and curium (Cm) using a single multi-stage column combined with alpha spectrometry. The method combines a rapid fusion step to dissolve refractory analytes and matrix removal using cerium fluoride precipitation to process the difficult soil matrix. Bill Burnett of FSU will present radium analysis using MnO_2 Resin and automated counting. Details of this presentation are provided below.

The workshop will also serve as a forum to update our users' on new products, applications and the continuous improvement of our quality system. Details on beryllium analysis in very difficult matricies and new uptake curves for our Ln series of resins will be presented. We also plan to discuss manufacturing issues including the introduction of a new cartridge mold and the conversion to new non-ionic frits for our pre-packaged column line.

As part of our ISO 9001:2000 continuous improvement program, new quality control methods have been developed for our resins. These are based on at least two components separated with vacuum box assisted resin cartridges. A progress report will be provided on the implementation of the new procedures.

Automated Radium Analyses Using MnO_2 Resin and a Radon Analyzer

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Eichrom introduced MnO_2 Resin last year as a preconcentrator for radium isotopes in water. Sherrod Maxwell has developed a method based on MnO_2 Resin to concentrate radium from natural waters and then using Ln Resin and DGA Resin for purification and separation of Ac (for ^{228}Ra). The alpha-emitting radium isotopes are assayed via alpha spectrometry after microprecipitation and mounting onto 0.1 μm filters.

We show here that one may also assay the alpha-emitting isotopes ^{226}Ra and ^{224}Ra using an automated approach that combines use of the MnO_2 Resin with a commercial radon-in-air analyzer (Durridge RAD-7). One simply passes a measured volume of a water sample through the resin that is loaded in a specially designed glass cartridge. The resin will quantitatively adsorb the radium up to flow rates of at least 100 mL/min. The cartridge is then connected to the radon analyzer via a simple system of tubes and valves and air is based through the resin that now emanates isotopes of radon (^{222}Rn and ^{220}Rn) from their respective radium parents. The RAD-7 analyzer sorts these isotopes via energy discrimination. This initial analysis is done for the analysis of the short-lived ^{224}Ra (^{223}Ra may also be detected via ^{219}Rn if present in sufficient activities). After the first analysis, the stopcock on the glass cartridge is closed and the time noted for ingrowth of ^{222}Rn from ^{226}Ra. After about 4-5 days (~50% equilibrium), the cartridge is again plumbed into the RAD-7 for analysis. If one requires ^{228}Ra as well, the MnO_2 Resin can be stripped with acid and Ac separated as in the Maxwell procedure.